
Chapter 5

Summary

This chapter provides a more detailed description of the nine I/I reduction projects that were identified by the benefit/cost analysis as cost effective. It lists specific conveyance facility improvement projects that could be eliminated, reduced, or delayed by implementing I/I reduction projects in accordance with the evaluation and selection process described in Chapter 4. Information about the locations of proposed I/I reduction projects, quantities of I/I removed, net cost savings, and projected benefit/cost ratio is also provided to expand the level of understanding for each project. See Appendices A1 through B1 for more detailed project information.

Considerations when reviewing the nine cost-effective I/I reduction projects include:

- The estimated cost of implementing the nine cost-effective I/I reduction projects is approximately \$73-million, based on the Engineering and Planning (E&P) Assumptions described in Chapters 3 and 4 of this report.
- The anticipated I/I reduction achievable is estimated at 22-million gallons per day (mgd), or approximately 18 percent of the I/I present in the impacted mini-basins and approximately 5 percent of the I/I present in the entire regional service area.
- As a result of reducing I/I flows, it is estimated that the capital costs for the nine identified impacted regional conveyance facility improvement projects could be reduced from approximately \$268-million to \$164-million, resulting in regional conveyance facility improvement savings of nearly \$104-million.
- The net overall savings realized from implementing the nine identified cost-effective I/I reduction projects is estimated at approximately \$31-million.
- This report is a planning-level document prepared to support decision-making about how to proceed with I/I reduction efforts in the regional wastewater service area.

The nine I/I reduction projects identified as cost effective may require the rehabilitation of laterals and side sewers in as many as 7000 private properties. Three key elements of the I/I control program that have contributed to the selection of this I/I rehabilitation technique include:

- Mini-Basin Hydrologic Modeling
- Pilot Project Results
- I/I Rehabilitation Assumptions

The hydrologic modeling of the mini-basins is one of the most important elements involved in the identification of I/I components, sources, and quantities generated from the mini-basins targeted for I/I reduction. As detailed in Section 3.2.4 of this analysis, the hydrologic modeling process begins with the calibration of the mini-basin hydrologic models to actual field measured flows and culminated in the separation of the total I/I flows into individual I/I flow components. These components are identified as

fast response, rapid infiltration, slow infiltration and base infiltration. Each of these identified flow components has a specific flow characteristic in response to a rainfall event that can be linked to a likely source of inflow and infiltration. These likely sources are presented in Table 3-1 and are supported by the results and findings from the ten I/I reduction pilot projects completed under the I/I Program.

One of the goals of the ten I/I reduction pilot projects was to establish the ability to locate the sources of I/I within the pilot project mini-basins and evaluate the effectiveness of several I/I reduction techniques. A discussion of the facts and findings from the ten I/I reduction pilot projects is presented in Section 3.2.5 of this analysis. This effort included an analysis of the flow monitoring and hydrologic modeling of the pilot project mini-basins, both before and after the I/I rehabilitation was completed. The results of the analysis provided a preliminary “field check” of the modeled flow components, likely I/I sources, and I/I reduction effectiveness for the pilot project mini-basins. The pilot projects also provided the basis for adjusting design-based construction cost estimates with actual final construction costs. Ultimately, the information developed and lessons learned from the pilot project provided the basis for the development of the I/I Rehabilitation Assumptions as presented in Section 3.2.5.3 of this analysis.

The Benefit/Cost Analysis Tool, as described in Section 4.2 of this analysis, utilized the information developed through the hydrologic model, pilot projects and I/I rehabilitation assumptions to identify the I/I reduction technique resulting in the lowest cost per gallon of I/I removed. The lowest cost per gallon technique for I/I reduction is used unless it fails to achieve the targeted level of I/I reduction to delay, reduce or eliminate a planned CSI facility. Under that condition an alternative I/I reduction technique is selected and evaluated to determine if it will reach the targeted level of I/I reduction and if the I/I reduction effort is cost effective.

This analysis process was completed for each of the 63 planned CSI projects and resulted in the identification of the nine cost effective I/I reduction projects, with the each utilizing I/I reduction techniques applied to private property laterals, side sewers and/or direct disconnects.

5.1 Nine Cost-Effective Projects

The proposed I/I reduction projects described herein were segregated by the wastewater treatment plant they discharge to, then listed in descending numerical order by their benefit/cost ratios.

One of the nine cost-effective I/I reduction projects is located in a basin tributary to the West Point Wastewater Treatment Plant, while eight projects are located in basins tributary to the South Wastewater Treatment Plant. Initially, finding only one cost-effective I/I reduction project in the West Point WWTP basin was unexpected given the age and materials that comprise the existing local agency conveyance systems. Upon further review it was determined that most of the needed regional conveyance and treatment facilities in the basin were already under construction or were too far along in the design process for consideration. Figure 5-1 illustrates the location of the proposed I/I reduction projects within the King County service area.

5.1.1 West Point Wastewater Treatment Plant Service Area - I/I Reduction Project

1. WE*LKHILLST.ENTR(3) (Redmond, Bellevue)

This proposed I/I reduction project could eliminate the need for the Lake Hills Trunk Third Barrel Upgrade. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in the City of Bellevue and one mini-basin in the City of Redmond. The estimated cost for the I/I reduction is \$11,307,000 and is projected to remove 2.2 mgd of I/I from the local agency collection system, which is approximately 20 percent of the total I/I present in these mini-basins. Figure 5-2 illustrates the location of the proposed I/I reduction project and the regional conveyance facilities impacted by the estimated reduction of I/I.

Eliminating the need for the Lake Hills Trunk Third Barrel Upgrade could save an estimated \$13,610,000 and would reduce the capacity needs of one upstream and five downstream conveyance facilities, saving an additional \$828,000. The dates by which the capacities of the upstream and downstream conveyance facilities are estimated to be exceeded in a 20-year flow event could also be delayed. The estimated net savings for this I/I reduction project would be \$3,131,000. This savings would yield a benefit/cost ratio of 1.3 to 1.

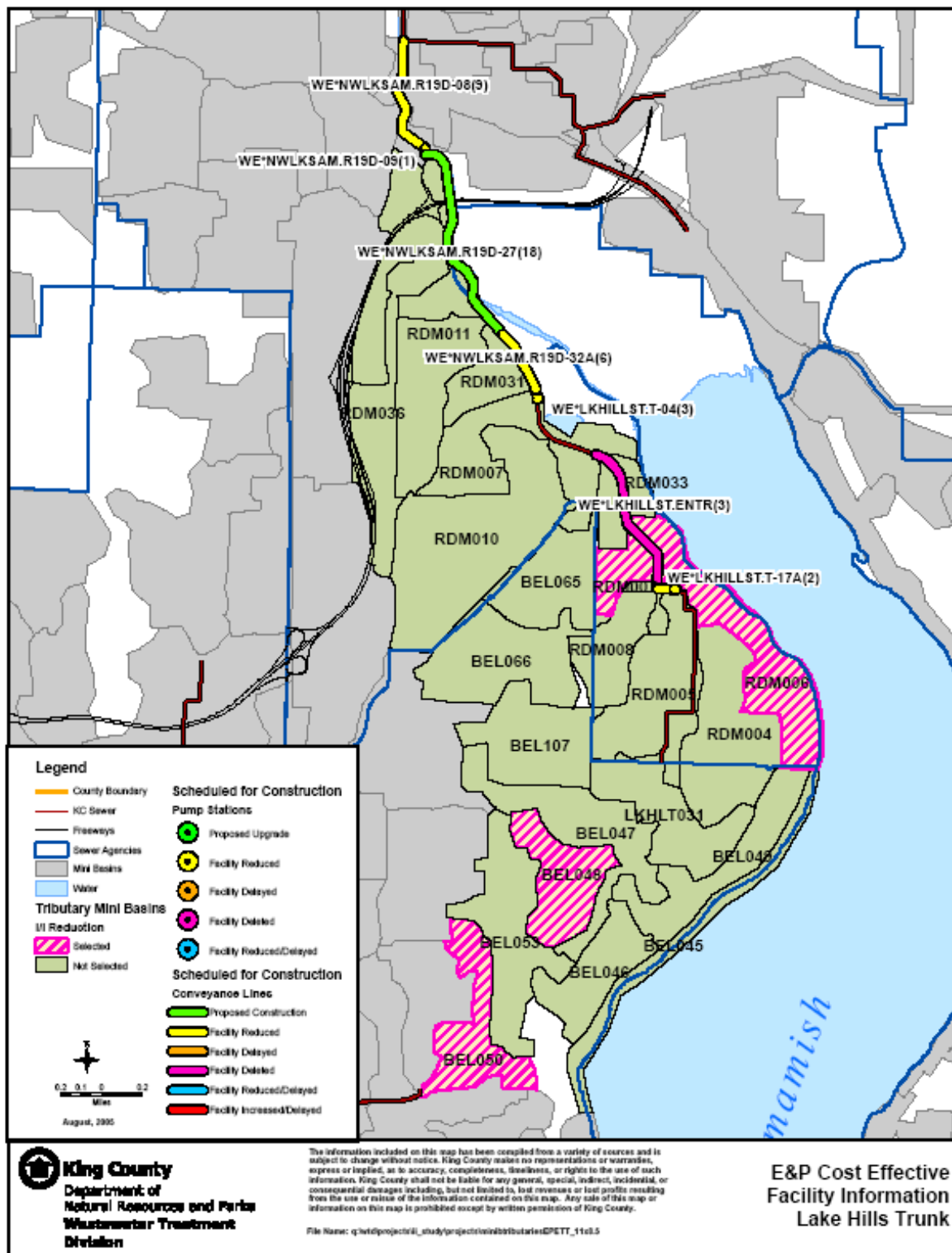


Figure 5-1. Lake Hills Trunk Third Barrel Upgrade

5.1.2 South Wastewater Treatment Plant Service Area - I/I Reduction Projects

2. RE*SRENTON.R18-16(9) (Soos Creek, Renton)

This proposed I/I reduction project could eliminate the need for the South Renton Interceptor Upgrade. The I/I reduction project includes side sewer and lateral rehabilitation in one mini-basin in Soos Creek and one mini-basin in the City of Renton. The estimated cost for the I/I reduction is \$2,218,000 and is projected to remove 0.81 mgd of I/I from the local agency collection system, which is approximately 11.6 percent of the total I/I present in these mini-basins. Figure 5-3 illustrates the location of the proposed I/I reduction project and the regional conveyance facilities impacted by the estimated reduction of I/I.

Eliminating the need for the South Renton Interceptor Upgrade could save an estimated \$7,270,000. The estimated net savings for this I/I reduction project would be \$5,052,000. This savings would yield a benefit/cost ratio of 3.28 to 1.

3. RE*ULID 1-4.S-31(8) (Kent)

This proposed I/I reduction project could eliminate the need for the Utility Local Improvement District (ULID) 1 Contract 4. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in the City of Kent. The estimated cost for the I/I reduction is \$999,000 and is projected to remove 1.08 mgd of I/I from the local agency collection system, which is approximately 19.6 percent of the total I/I present in these mini-basins. Figure 5-4 shows the location of the proposed I/I reduction project and the regional conveyance facilities impacted by the estimated reduction of I/I.

Eliminating the need for the ULID 1 Contract 4 pipeline could save an estimated \$2,410,000. The estimated net savings for this I/I reduction project would be \$1,411,000. This savings would yield a benefit/cost ratio of 2.41 to 1.

4. AUBURN 3 STORAGE (Auburn, Pacific)

This proposed I/I reduction project could reduce the size of the Auburn Twin Tube Storage Facility. The I/I reduction project includes side sewer and lateral rehabilitation in five mini-basins in the City of Auburn and one mini-basin in the City of Pacific. The estimated cost for the I/I reduction is \$11,363,000 and is projected to remove 6.87 mgd of I/I from the local agency collection system, which is approximately 13 percent of the total I/I present in these mini-basins. Figure 5-5 shows the location of the proposed I/I reduction project and the regional facilities impacted by the estimated reduction of I/I.

Reducing the size of the Auburn Twin Tube Storage Facility could save an estimated \$17,200,000, eliminate one upstream conveyance facility, and reduce the projected capacity needs and cost of six additional upstream conveyance facilities, saving an additional \$5,790,000. The dates by which the capacities of nine upstream conveyance facilities are

estimated to be exceeded in a 20-year flow event could be delayed. The estimated net savings for this I/I reduction project would be \$11,627,000. This savings would yield a benefit/cost ratio of 2.02 to 1.

5. RE*ISSAQ2.R17-40(3) (Issaquah)

This proposed I/I reduction project could eliminate the need for the Issaquah2 Trunk. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in the City of Issaquah. The estimated cost for the I/I reduction is \$3,965,000 and is projected to remove 1.05 mgd of I/I from the local agency collection system, which is approximately 19.4 percent of the total I/I present in these mini-basins. Figure 5-6 illustrates the location of the proposed I/I reduction project and regional conveyance facilities impacted by the estimated reduction of I/I.

Eliminating the need for the Issaquah2 Trunk could save an estimated \$2,430,000 (see Project 7, EASTGATE STORAGE AND TRUNK (Bellevue), below) and eliminate one downstream conveyance facility, saving an additional \$3,340,000. The estimated net savings for this I/I reduction project would be \$1,805,000. This savings would yield a benefit/cost ratio of 1.46 to 1.

6. BRYN MAWR STORAGE (Bryn Mawr)

This proposed I/I reduction project could reduce the size of the Bryn Mawr Tube Storage Facility. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in Bryn Mawr. The estimated cost for the I/I reduction is \$6,019,000 and is projected to remove 2.04 mgd of I/I from the local agency collection system, which is approximately 12.6 percent of the total I/I present in these mini-basins. Figure 5-7 illustrates the location of the proposed I/I reduction project and the regional facilities impacted by the estimated reduction of I/I.

Reducing the size of the Bryn Mawr Tube Storage Facility could save an estimated \$8,510,000. The dates by which the capacity of the conveyance facility is estimated to be exceeded by a 20-year flow event could also be delayed. The estimated net savings for this I/I reduction project would be \$2,491,000. This savings would yield a benefit/cost ratio of 1.41 to 1.

7. EASTGATE STORAGE AND TRUNK (Bellevue)

This proposed I/I reduction project could eliminate the need for the Eastgate Tube Storage Facility improvement. The I/I reduction project includes side sewer and lateral rehabilitation in five mini-basins in the City of Bellevue. The estimated cost for the I/I reduction is \$14,460,000 and is projected to remove 3.55 mgd of I/I, which is approximately 40.8 percent of the total I/I present in these mini-basins. Figure 5-8 illustrates the location of the proposed I/I reduction project and the regional facilities impacted by the estimated reduction of I/I.

Eliminating the need for the Eastgate Tube Storage Facility improvement could save an estimated \$21,120,000 (see Project 5, RE*ISSAQ2.R17-40(3) (Issaquah), above) and would also eliminate or impact the capacities of four upstream conveyance facilities, saving an

additional \$1,339,000. The dates by which the capacities of seven upstream conveyance facilities are estimated to be exceeded in a 20-year flow event could also be delayed.

Eliminating the Eastgate Tube Storage Facility would require upsizing the upstream Issaquah Tube Storage Facility at an additional estimated cost of \$5,830,000. The estimated net savings for this I/I reduction project would be \$2,169,000. This savings would yield a benefit/cost ratio of 1.15 to 1.

8. RE*FACTOR.RO6-05(7) (Bellevue)

This proposed I/I reduction project could reduce the capacity requirement for the Factoria Trunk and Wilburton Pump Station Upgrade. The I/I reduction project includes side sewer and lateral rehabilitation in six mini-basins in the City of Bellevue. The estimated cost of the I/I reduction is \$10,550,000 and is projected to remove 2.39 mgd of I/I, which is approximately 23 percent of the total I/I present in these mini-basins. Figure 5-9 illustrates the location of the proposed I/I reduction project and the regional conveyance facilities impacted by the estimated reduction of I/I.

Reducing the capacity requirement for the Factoria Trunk and Wilburton Pump Station Upgrade could save an estimated \$346,000 and would also eliminate two upstream conveyance facilities, saving an additional \$11,712,000. The date by which the capacity of this conveyance facility is estimated to be exceeded in a 20-year flow event could also be delayed. The estimated net savings for this I/I reduction project would be \$1,508,000. This savings would yield a benefit/cost ratio of 1.14 to 1.

9. RE*ULID 1-5.57I(10) (Kent)

This proposed I/I reduction project could eliminate the need for the Garrison Creek Trunk improvement. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in the City of Kent and one Utility Local Improvement District (ULID) mini-basin. The estimated cost for the I/I reduction project is \$12,013,000 and is projected to remove 2.12 mgd of I/I from the local agency collection system, which is approximately 37.2 percent of the total I/I present in these mini-basins. Figure 5-10 illustrates the location of the I/I reduction project and the regional conveyance facilities impacted by the estimated reduction of I/I.

Eliminating the Garrison Creek Trunk improvement would save an estimated \$12,059,000 and would also eliminate one upstream conveyance facility, saving an additional \$1,601,000. The estimated net savings for this I/I reduction project would be \$1,647,000. This savings would yield a benefit/cost ratio of 1.14 to 1.

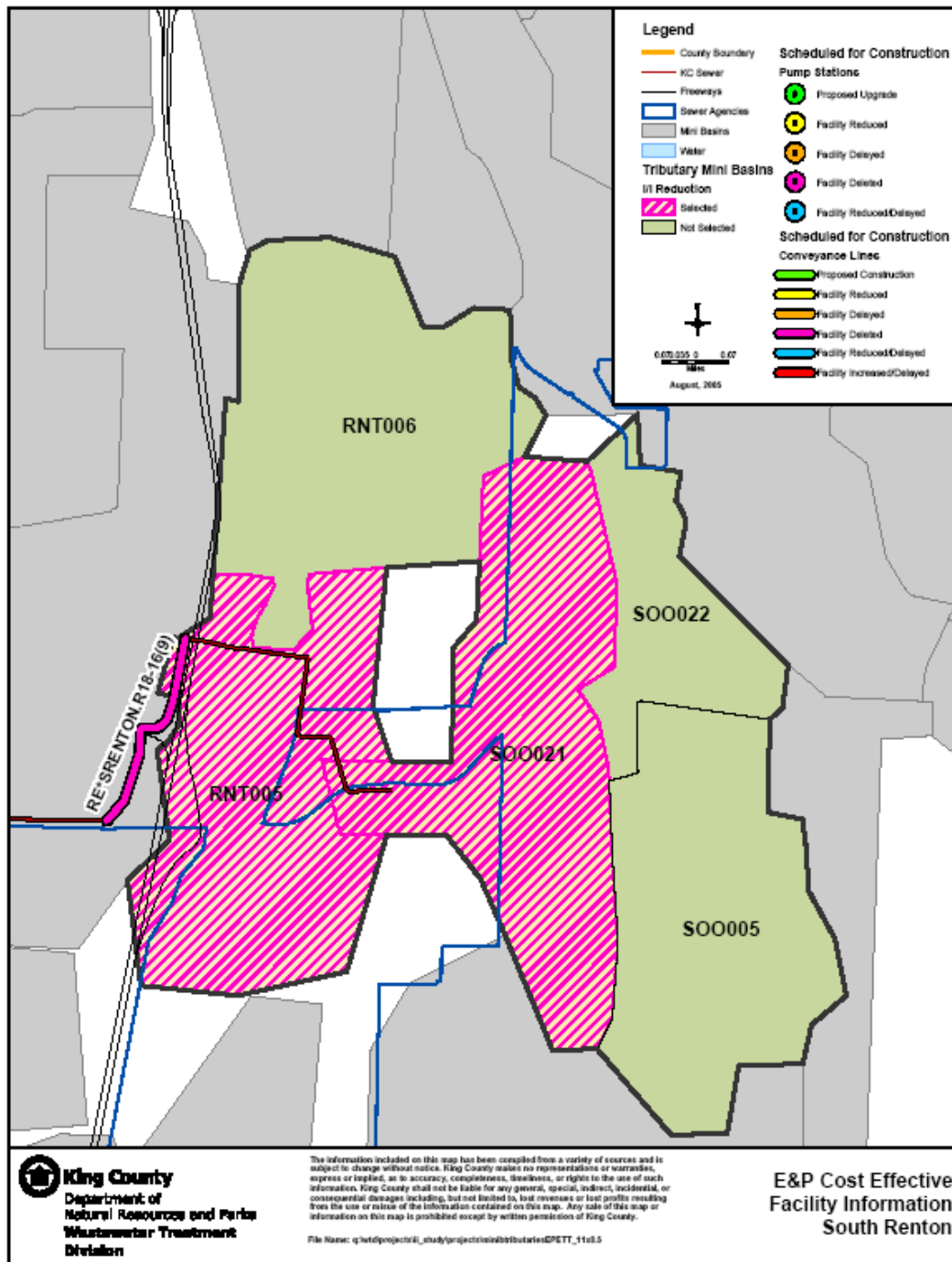


Figure 5-2. South Renton Interceptor Upgrade

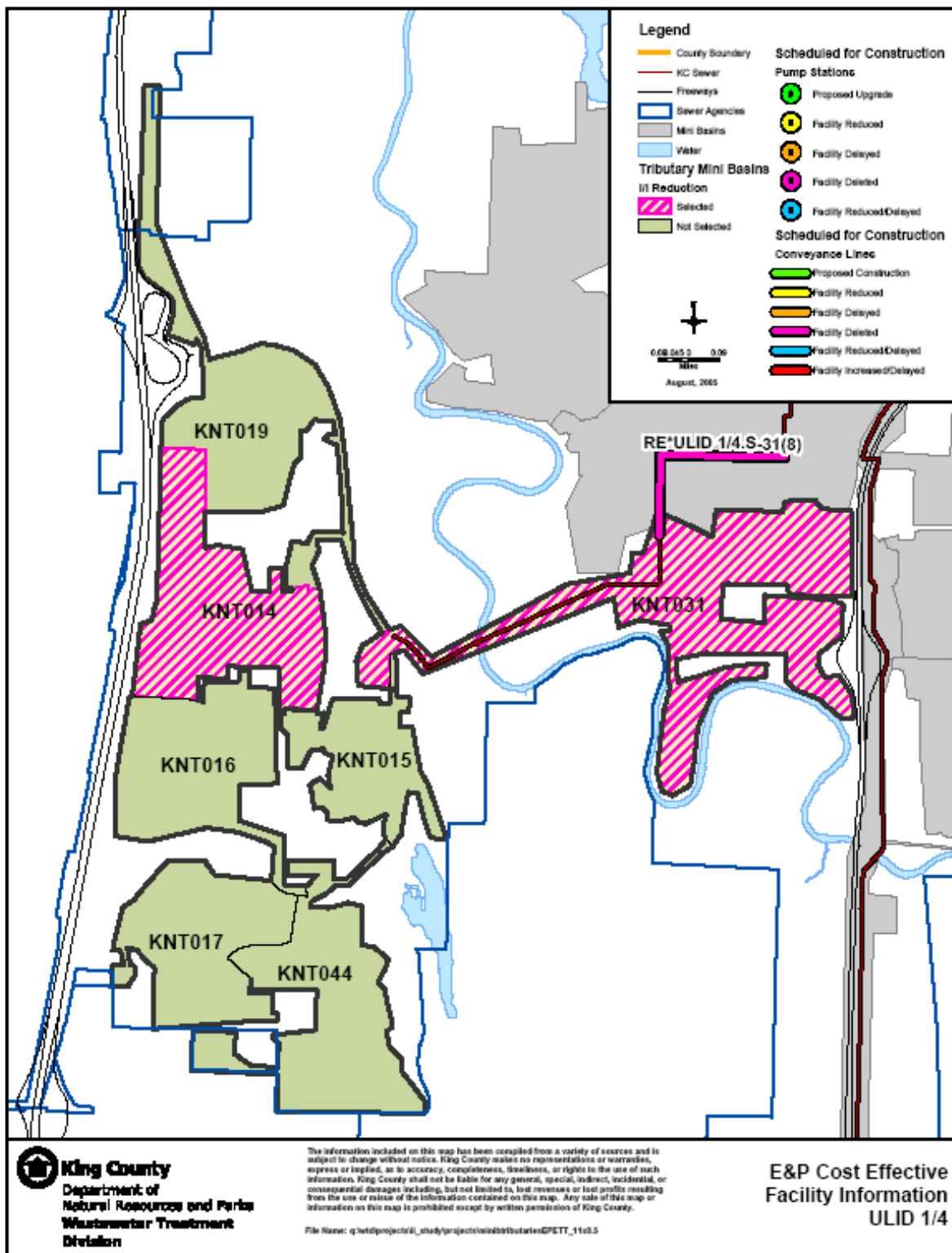


Figure 5-3. ULID 1 Contract 4

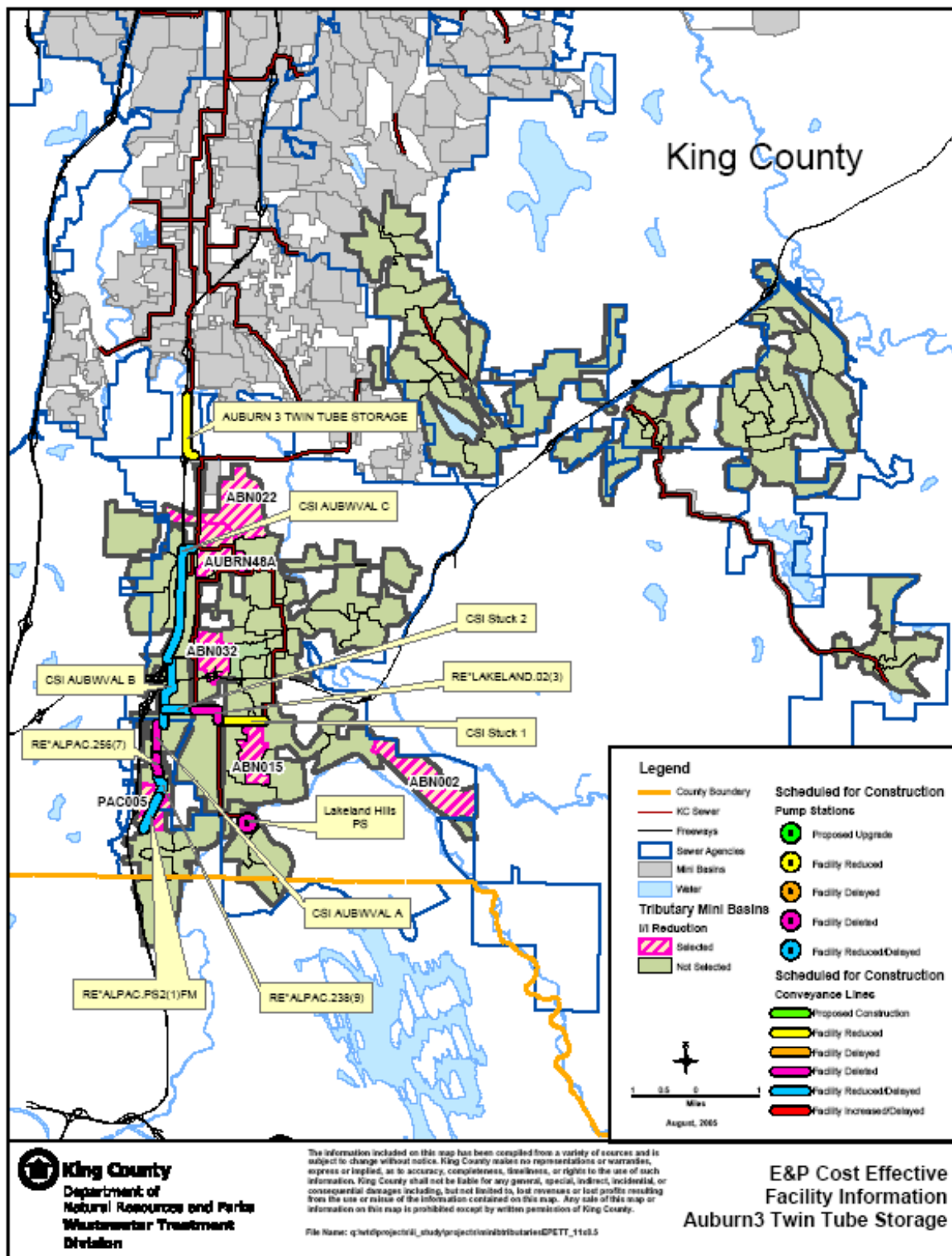


Figure 5-4. Auburn Twin Tube Storage Facility

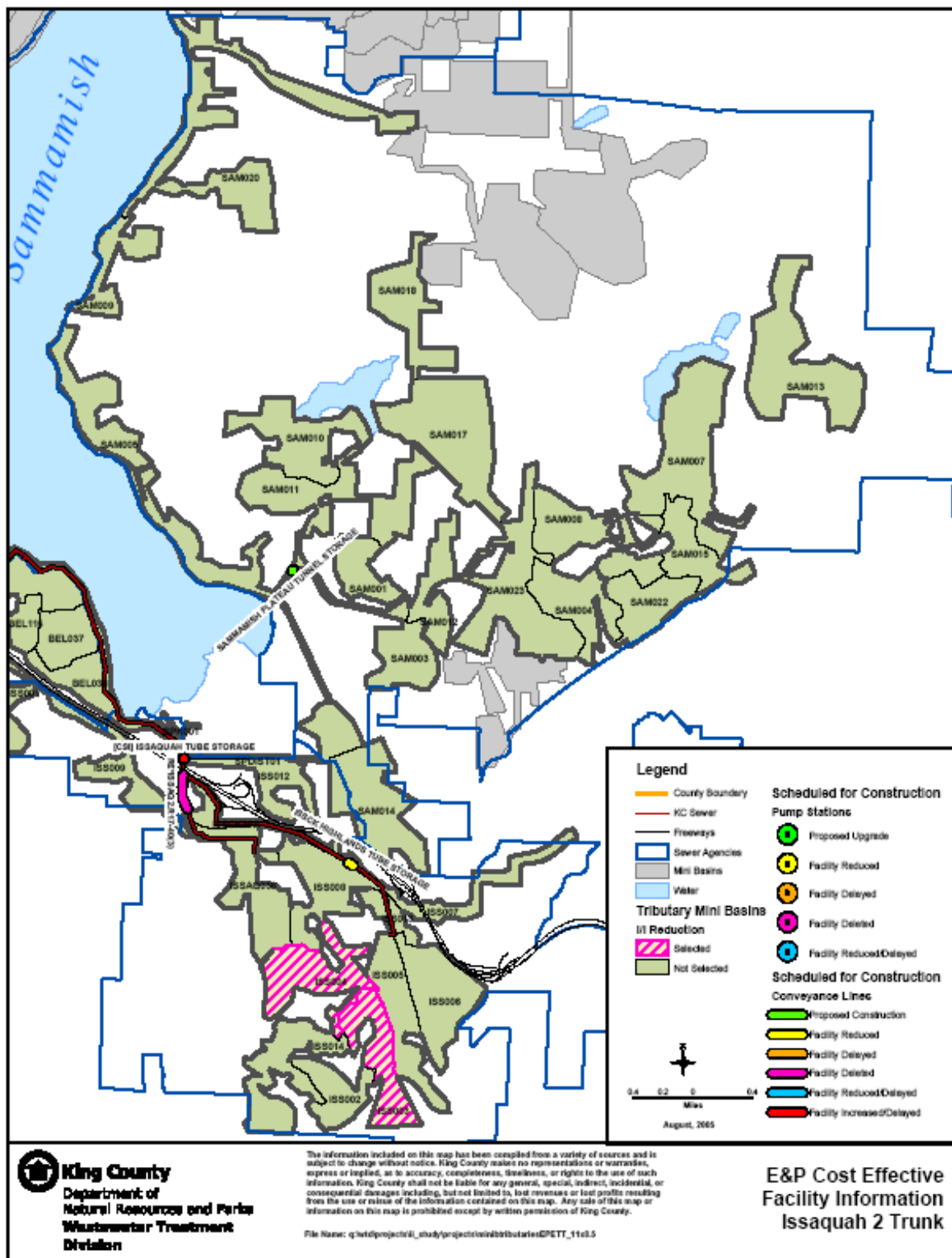


Figure 5-5. Issaquah 2 Trunk

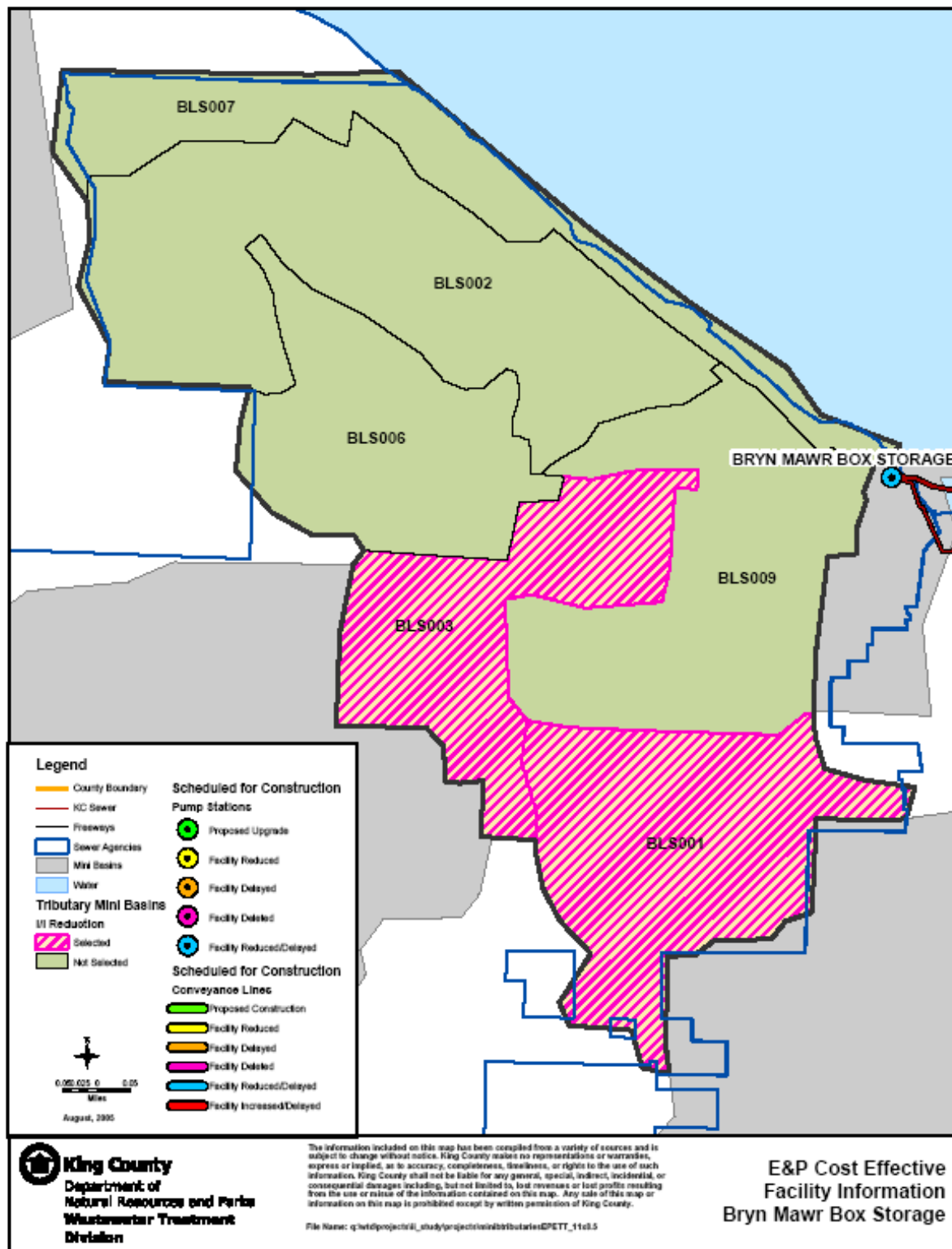


Figure 5-6. Bryn Mawr Tube Storage Facility

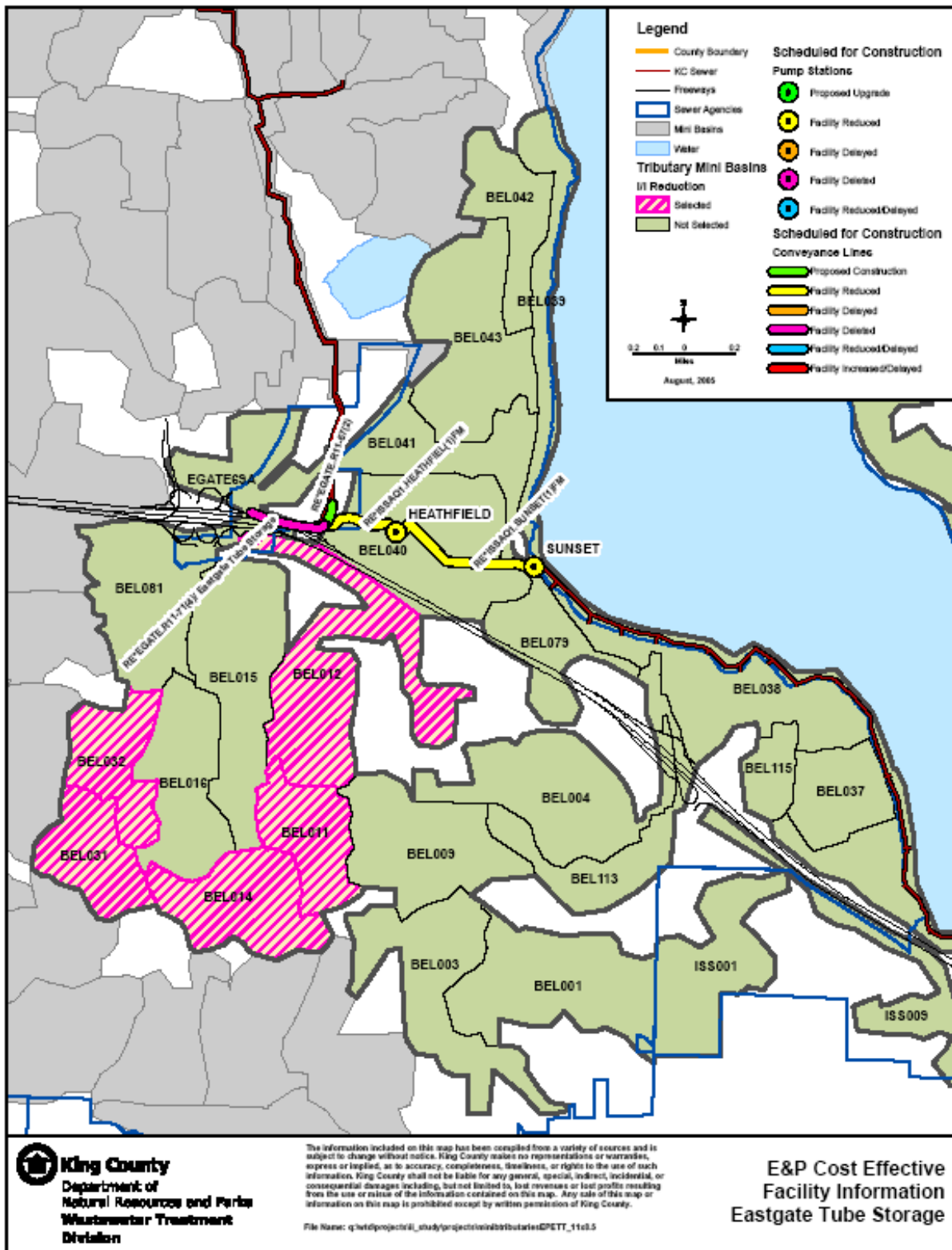


Figure 5-7. Eastgate Tube Storage Facility

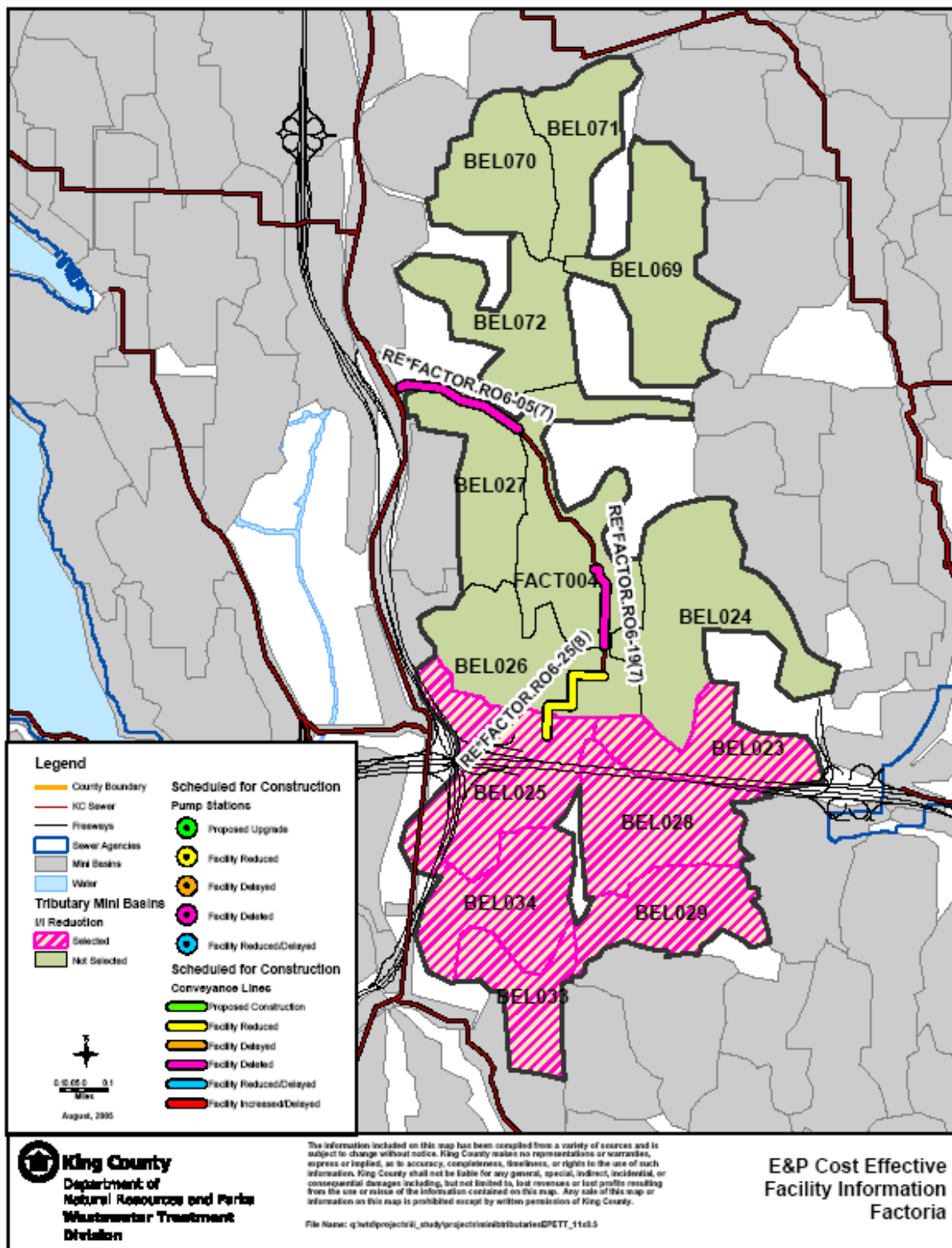


Figure 5-8. Facteria Trunk and Wilburton Pump Station

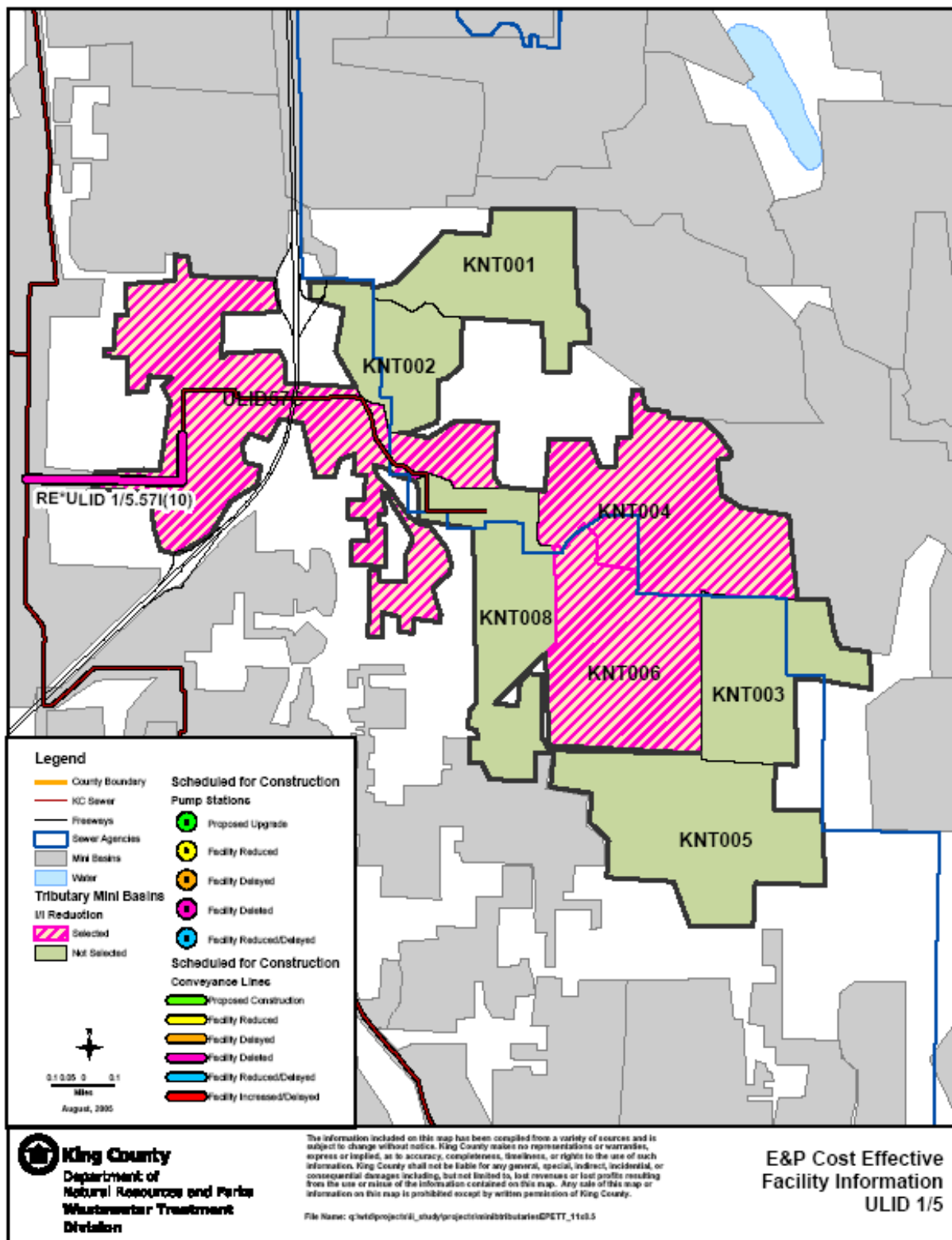


Figure 5-9. ULID 1-5 Garrison Creek Trunk